

PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Reciprocatory Pumps

We, JOSEPH LUCAS (INDUSTRIES) LIMITED, of Great King Street, in the City of Birmingham, 19., a British Company, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention has for its object to provide a reciprocatory pump in a simple and compact form.

A pump in accordance with the invention comprises a body part having at least one radial cylinder, a hollow piston in the cylinder, a slipper situated in contact with the inner end of the piston and having therein a transverse circular bore, and an actuating spindle having thereon a cylindrical eccentric which occupies the bore of the slipper, the piston, slipper and eccentric being ported as described for controlling the fluid-flow through the pump.

In the accompanying drawings:—

Figures 1 and 2 are respectively a sectional plan and end elevation illustrating one embodiment of the invention.

Figures 3 and 4 are respectively similar views to Figures 1 and 2 illustrating an alternative embodiment.

Figure 5 is a perspective view of the yoke piece employed in the construction shown in Figures 3 and 4.

Referring to Figures 1 and 2, a hollow body part *a* has formed on it four radial cylinders *b* arranged at 90° apart and extending from a central chamber *c* in the body part, the cylinders being closed at their outer ends. In each cylinder is contained a hollow piston *d* having a flat inner end in which is provided a central port *e*. Each piston is loaded by a spring *f*.

Between and in contact with the inner ends of the pistons is arranged a slipper *g* of square shape, and in the slipper is formed a transverse circular hole which is occupied by a cylindrical eccentric *h* formed on a driving spindle *i*, the latter being supported at its ends

by bearings in the body part. One end of the spindle extends beyond the body part and is adapted for attachment to any desired driving means. The other end is enclosed by the body part.

On the body part is formed a fluid inlet *j* which communicates with the central chamber *c* above mentioned by way of a passage *k*, and an outlet *m* is provided on the part which encloses one end of the spindle *i*.

The necessary porting, in addition to the ports in the piston ends, is provided in the following manner. In each of the peripheral flat faces of the slipper is formed a groove *n* leading from the central chamber *c* to the port *e* in the associated piston end, and also a hole *o* extending to the eccentric. Also in the periphery of the eccentric is formed a segmental groove *p* which is in communication with a bore *q* in the spindle by way of a radial port *r*. Also the spindle is provided with a radial port or ports *s* leading from the bore to an annular groove *t* in the body part and thence through a passage *u* to the outlet.

Rotation of the spindle *i* causes the eccentric *h* to impart reciprocatory motions to the slipper in two directions which are mutually at right angles to each other for effecting reciprocation of the pistons. During the suction stroke of each piston fluid flows from the central chamber *c* along the groove *n* in the associated face of the slipper to the port *e* in the inner end of the piston and thence through the piston to the associated cylinder. During the discharge stroke the fluid passes from the cylinder through the end port of the piston and the hole *o* in the slipper to the groove *p* in the eccentric, and thence along the spindle bore to the outlet. While any one of the pistons is effecting its suction stroke the opposite piston is effecting its discharge stroke.

The construction shown in Figures 3 and 4 is similar to that above described, but differs in that the springs *f* are not provided, and the

two pistons in each pair are interconnected by a yoke piece of the form shown in Figure 5. The yoke piece consists of a flat plate *v* having at its ends lugs *w* adapted to engage circumferential grooves *x* in the pistons. Also in the plate *v* is formed a slot *y* through which passes the adjacent part of the spindle *z*.

A pump as above described may be used for pumping either liquids or gases, but it is especially useful for supplying liquid fuel to an engine. The invention is not, however, restricted to the example described, as the number of cylinders and pistons may be varied, and for some purposes a single cylinder and piston may suffice.

What we claim is:—

1. A reciprocatory pump comprising a body part having at least one radial cylinder, a hollow piston in the cylinder, a slipper situated in contact with the inner end of the piston and

having therein a transverse circular bore, and an actuating spindle having thereon a cylindrical eccentric which occupies the bore of the slipper, the piston, slipper and eccentric being ported as described for controlling the fluid-flow through the pump.

2. A reciprocatory pump as claimed in Claim 1, and comprising a pair of a plurality of pairs of colinear pistons and cylinders, the slipper being situated between the adjacent ends of the pistons, and the latter being loaded by springs or interconnected by a yoke piece or pieces.

3. A reciprocatory pump comprising the construction and arrangement of parts, substantially as described and as exemplified by Figures 1 and 2, or Figures 3—5 of the accompanying drawings.

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PROVISIONAL SPECIFICATION

Reciprocatory Pumps

We, JOSEPH LUCAS (INDUSTRIES) LIMITED of Great King Street, in the City of Birmingham, 19, a British Company, do hereby declare this invention to be described in the following statement:—

This invention has for its object to provide a reciprocatory pump in a simple and compact form.

A pump in accordance with the invention comprises a body part having at least one radial cylinder, a hollow piston in the cylinder, a slipper situated in contact with the inner end of the piston and having therein a transverse circular bore, and an actuating spindle having thereon a cylindrical eccentric which occupies the bore of the slipper, the piston, slipper and eccentric being ported as hereinafter described for controlling the fluid-flow through the pump.

In one example a hollow body part has formed on it four radial cylinders arranged at 90° apart and extending from a central chamber in the body part, the cylinders being closed at their outer ends. In each cylinder is contained a hollow piston having a flat inner end in which is provided a central port. Each piston may be loaded by a spring, or each opposite pairs of pistons may be interconnected by a yoke.

Between and in contact with the inner ends of the pistons is arranged a slipper of square shape, and in the slipper is formed a transverse circular hole which is occupied by a cylindrical eccentric formed on a driving spindle, the latter being supported at its ends by bearings in the body part. One end of the spindle extends beyond the body part and is adapted for attachment to any desired driving means. The other end is enclosed by the body part.

On the body part is formed a fluid inlet which communicates with the central chamber above mentioned, and an outlet is provided on the part which encloses one end of the spindle.

The necessary porting in addition to the ports in the piston ends, is provided in the following manner. In each of the peripheral flat faces of the slipper is formed a groove leading from the central chamber to the port in the associated piston end, and also a hole extending to the eccentric. Also in the periphery of the eccentric is formed a segmental groove which is in communication with a bore in the spindle, the latter being provided with a radial port or ports leading from the bore to an annular groove in the body part and thence to the outlet.

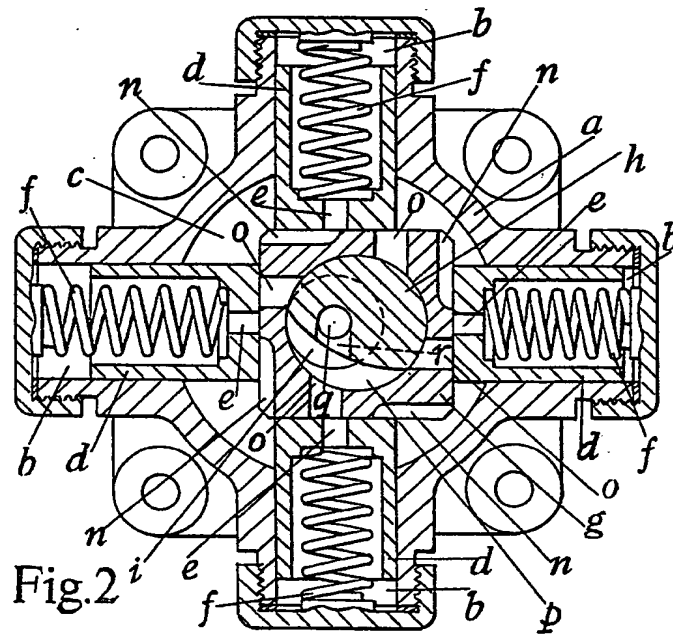
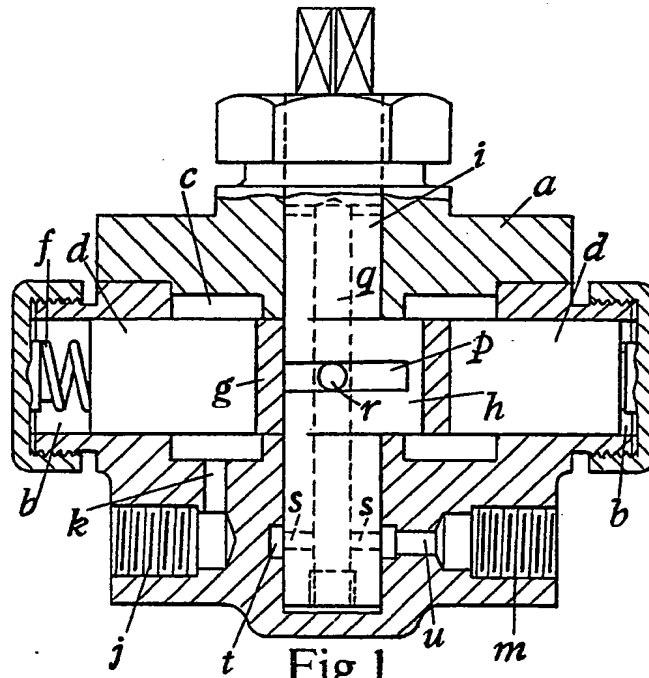
Rotation of the spindle causes the eccentric to impart reciprocatory motions to the slipper in two directions which are mutually at right angles to each other for effecting reciprocation of the pistons. During the suction stroke of each piston fluid flows from the central chamber along the groove in the associated face of the slipper to the port in the inner end of the piston and thence through the piston to the associated cylinder. During the discharge stroke the fluid passes from the cylinder through the end port of the piston and the hole in the slipper to the groove in the eccentric, and thence along the spindle bore to the outlet. While any one of the pistons is effecting its suction stroke the opposite piston is effecting its discharge stroke.

A pump as above described may be used for pumping either liquids or gases, but it is especially useful for supplying liquid fuel to an engine. The invention is not, however, restricted

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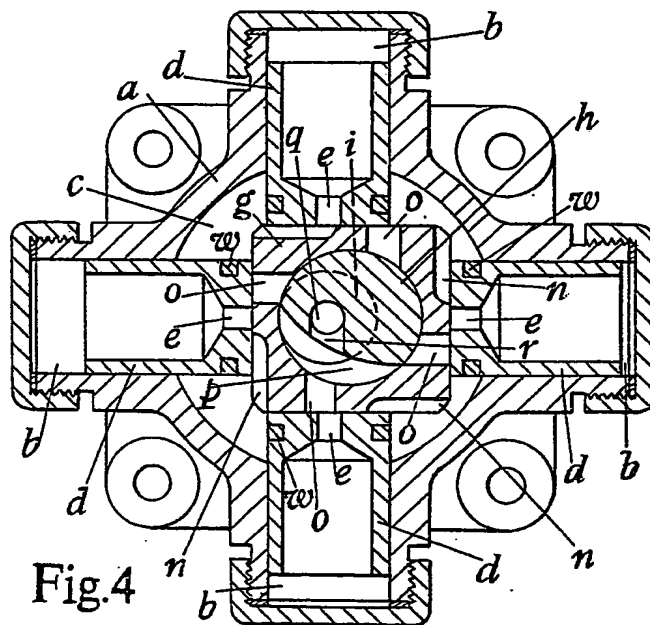
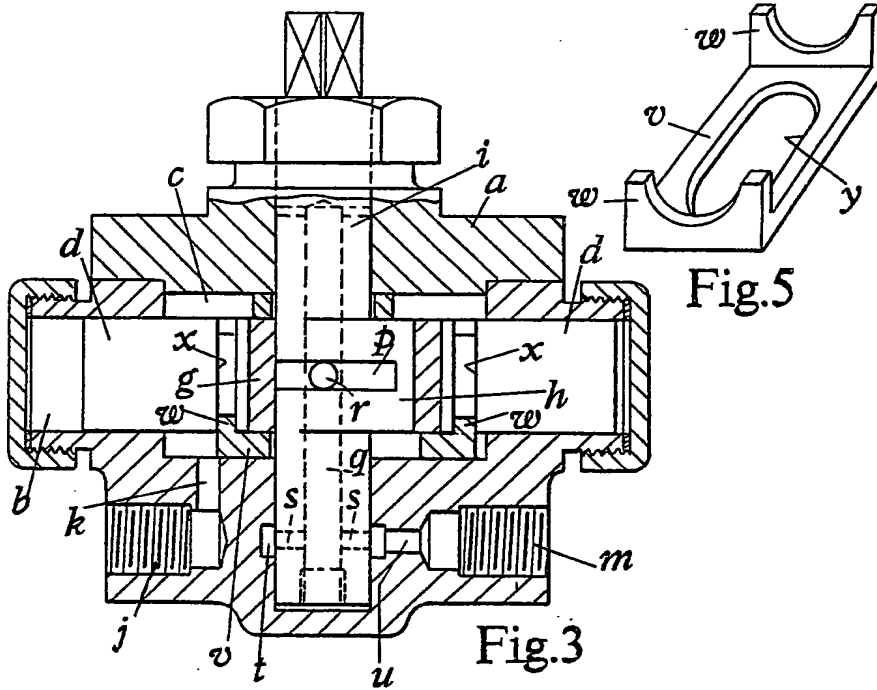


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SHEETS 1 & 2



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